

Urban Water Supply and Sanitation: Herculean Task

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Abstract—Urban water supply and sanitation are the most important basic needs for the improvement of the quality of life and enhancement of productive efficiency of citizens. In urban areas, water is tapped for domestic, municipal and industrial uses from rivers, streams, wells and lakes. Almost 80% of the water supplied for domestic use, most of the industrial water and other water comes out in the form of wastewater on roads, in streets and finally turning the rivers into sewers.

In most of the cases wastewater is let out untreated and it either sinks into the ground as a potential pollutant of ground water or is discharged into the natural drainage system causing pollution in downstream areas.

For sustainability of human civilization, man has to manage his water. Water is the precious nectar around which the human civilization has developed. He has to seriously manage his wastewater, which is making the rivers, cities etc. a real hell on this earth.

According to the Central Pollution Control Board, New Delhi, municipal sewage may be defined as “Mostly liquid waste originating from a community; may be composed of domestic wastewaters and/or industrial discharges”. It is major source of water pollution in India, particularly in and around large urban centers. In India about 78% of the urban population has access to safe drinking water and about 38% of the urban population has access to sanitation services.

With the enhancement of drinking water supply, life style changes and poor management of water and wastewater in urban areas, the wastewater generation is increasing. If such wastewater is not collected, treated and disposed properly, it will directly contribute to pollution of the locally available freshwater supplies - rivers, lakes, ponds etc. Additionally, the cumulative results of untreated wastewater have broad degenerative effects on both public health and health of the ecosystem.

Therefore, urban environmental management is one of the most pressing issues as the urbanization trend continues globally. Among the challenges faced by urban planners is the need to ensure better basic human services such as the provision of clean water and better sanitation. we must therefore, understands these issues and help in providing efficient and cost effective wastewater management services to one and all. Recycling and re-using with care has to be on top priority, to avoid the third world war on water.

1. INTRODUCTION

Drinking Water Supply and Sanitation is an international priority and a scientific challenge. More than one billion people in the world today lack access to safe drinking water. The United Nations Millennium Development Goals’ initiative aimed to cut this figure in half by 2015.

Major infrastructure developments, specifically in urban areas, are needed to make this vision a reality. The development and operation of urban water supply (UWS) systems, and infrastructure in general, has largely been the responsibility of the public sector in both developing and developed countries alike. In many countries, service provision has been hampered by public sector financial and capacity constraints.



In India, access to improved source of water in 2011 to Urban and Rural citizens was 96% and 89% respectively (average 92%). Access to improved sanitation was 60% and 24% % respectively (average 35%). Average urban water use was 126 liter/capita/day (2006). Annual investment in water supply and sanitation has been US\$ 5 / capita. Thus we see that drinking water supply and sanitation in India continue to be inadequate, despite longstanding efforts by the various levels of government and communities at improving coverage.

Per capita water availability in India is diminishing day by day as shown below :

1947	6008 cubic metres / year
1951	5177 cubic metres / year
2001	1820 cubic metres / year
2025	1340 cubic metres / year
2050	1140 cubic metres / year

On the one hand, the world's water is increasingly becoming degraded in quality, threatening the health of people and ecosystems and increasing the cost of treatment.



These maladies are rooted in a wasteful use of water, characterized by poor management systems, improper economic incentives, underinvestment, failure to apply existing technologies and an antiquated mindset focused almost exclusively on developing new supplies – to the exclusion of conservation and efficiency measures.

There are many facets of the water maladies e.g. water and energy are intricately connected. Producing energy uses and pollutes large amounts of water. Likewise, providing and using water requires large amounts of energy. New threats include the challenges of climate change, which is likely to alter both water availability and agricultural water demands.

Over the next three decades, threats to water and food security will grow as the global population continues to climb, dietary preferences change and the climate becomes more variable. We need to identify ways to ensure clean water for current and future generations.

We need to identify challenges facing our water resources and find solutions – solutions that promote the sustainable management of water resources, in India and around the world.

Our research brings attention to key issues that have often been overlooked: the impact of climate change on water, water as a basic human right, the importance of conservation and efficiency, the role of water in conflict, the globalization and privatization of water, threats to the world's water and more.

2.1 Challenges – Water Supply

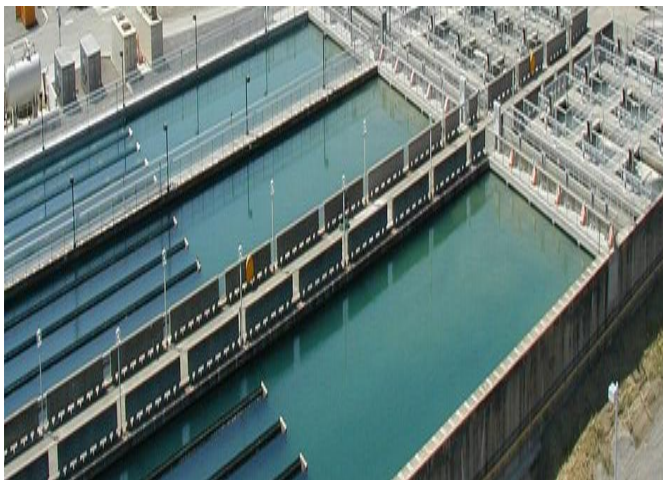
In 2010, only two cities in India- Thiruvananthapuram and Kota get continuous water supply. In 2005 none of the 35 Indian cities with a population of more than one million distributed water for more than a few hours per day, despite generally sufficient infrastructure. Owing to inadequate pressure people struggle to collect water even when it is available. According to the World Bank, none have performance indicators that compare with average international standards.

2. THE PROBLEM

The world's water problems stem from our failure to meet basic human needs, ineffective or inappropriate institutions and management and our inability to balance human needs with the needs of the natural world.

In 2010, the UN estimated based on Indian statistics that 626 million people practice open defecation. In June 2012, the then Minister of Rural Development Sh. Jairam Ramesh stated 'India is the world's largest open air toilet'. He also remarked that Pakistan, Bangladesh and Afghanistan have better sanitation records.

According to Indian norms, access to improved water supply exists if at least 40 liters /capita /day of safe drinking water are provided within a distance of 1.6 km or 100 meter of elevation difference, to be relaxed as per field conditions. There should be at least one pump per 250 persons.



A 2007 study by the Asian Development Bank showed that in 20 cities the average duration of supply was only 4.3 hours per day. None of the 20 cities had continuous supply. The longest duration of supply was 12 hours per day in Chandigarh, and the lowest was 0.3 hours per day in Rajkot. According to the results of a Service Level Benchmarking (SLB) Program carried out by the Ministry of Urban Development (MoUD) in 2006 in 28 cities, the average duration of supply was 3.3 hours per day, with a range from one hour every three days to 18 hours per day.



In Delhi residents receive water only a few hours per day because of inadequate management of the distribution system. This results in contaminated water and forces households to complement a deficient public water service at prohibitive 'coping' costs; the poor suffer most from this situation.

For example, according to a 1996 survey households in Delhi spent an average of Rs. 2,182 (US\$34.00) per year in time and money to cope with poor service levels. This is more than two times as much as the 2001 water bill of about US\$18 per year of a Delhi household that uses 20 cubic meters per month.

2.2 Sanitation Challenge

Most Indians depend on on-site sanitation facilities which means mainly pit latrines in rural areas. In rural areas, the government has been promoting community-led sanitation approaches such as the Total Sanitation Campaign, with some success. In urban areas, a good practice example is the Slum Sanitation Program in Mumbai that has provided access to sanitation for a quarter million slum dwellers. Sewerage, where available, is often in a bad state.

In Delhi the sewerage network has lacked maintenance over the years and overflow of raw sewage in open drains is common, due to blockage, settlements and inadequate pumping capacities. The capacity of the 17 existing wastewater treatment plants in Delhi is adequate to cater a daily production of waste water of less than 50% of the drinking water produced. Of the 2.5 billion people in the world that defecate openly, some 665 million live in India, making it the country with the highest number of people who defecate in the open. This has serious public health implications.

A specific Indian problem is "manual scavenging" which is connected to the officially banned caste system and relates to unsafe and undignified emptying of toilets and pits, as well as handling of raw, untreated human excreta.

Depleting ground water table and deteriorating ground water quality are threatening the sustainability of both urban and rural water supply in many parts of India. The supply of cities that depend on surface water is threatened by pollution, increasing water scarcity and conflicts among users. For example, Bangalore depends to a large extent on water pumped since 1974 from the Kaveri river, whose waters are disputed between the States of Karnataka and Tamil Nadu.

2.3 Climate Change and Water

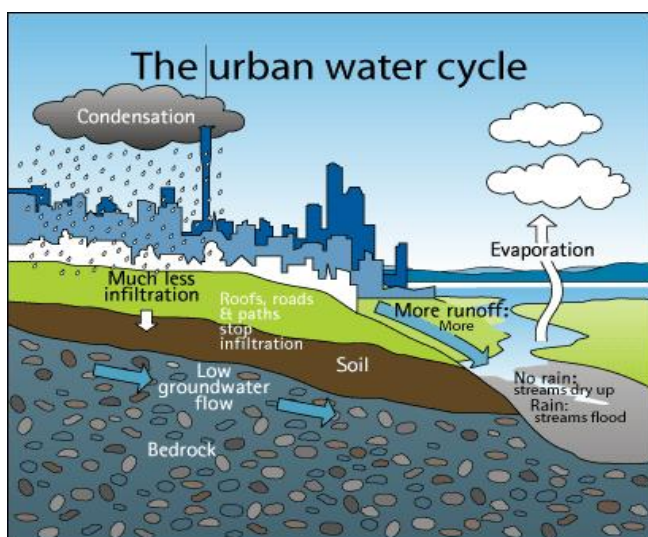
Warming temperatures, changes in precipitation, and sea level rise have affected and will likely continue to affect water supply and quality. Changes will vary in different regions of India; potential effects include increased flooding and drought, water quality impairment and salt water intrusion to coastal water supplies. Changes to our water resources affect many sectors, including energy production, infrastructure, human health, agriculture, and ecosystems.

Water resources are important to both society and ecosystems. We depend on a reliable, clean supply of drinking water to sustain our health. We also need water for agriculture, energy production, navigation, recreation, and manufacturing. Many of these uses put pressure on water resources, stresses that are likely to be exacerbated by climate change. In many areas, climate change is likely to increase water demand while shrinking water supplies. This shifting balance would challenge water managers to simultaneously meet the needs of growing communities, sensitive ecosystems, farmers, ranchers, energy producers, and manufacturers. In some areas,

water shortages will be less of a problem than increases in runoff, flooding, or sea level rise. These effects can reduce the quality of water and can damage the infrastructure that we use to transport and deliver water.

2.4 The Urban Water Cycle

The natural water cycle still occurs in urban areas, however there are some changes which are the result of increased population, increased buildings and development. The urban water cycle shows the consequences of increased development. More development and more concrete means less infiltration of rainwater into the soil and more run off. The city rain water and other water comes out in the form of wastewater on roads turning the roads into rivers and the rivers into sewers.



3. THE SOLUTION

The level of investment in water and sanitation, albeit low by international standards, has increased in size during the 2000s. Access has also increased significantly. For example, in 1980 rural sanitation coverage was estimated at 1% and reached 21% in 2008. Also, the share of Indians with access to improved sources of water has increased significantly from 72% in 1990 to 88% in 2008. At the same time, local government institutions in charge of operating and maintaining the infrastructure are seen as weak and lack the financial resources to carry out their functions. In addition, only two Indian cities have continuous water supply and an estimated 69% of Indians still lack access to improved sanitation facilities.

Our push toward a re-evaluation of the importance of water-use conservation and efficiency is leading to fundamental changes in water policy. The work continues, because more needs to be done – much more. The most important change we can make is in the way we think about, value and manage our water resource.

We should seek to take advantage of the potential for decentralized facilities, efficient technologies, flexible public and private institutions, innovative economics and our huge human capital.



The governments, companies and individuals need to focus on sustainable ways to satisfy the needs of people and businesses, instead of just supplying water.

We should develop water systems that supply water of various qualities for different uses. For instance, storm runoff, grey water and reclaimed wastewater are well-suited to irrigate landscaping or for some industrial purposes.



Water personnel are required to interact closely with water users and to engage community groups in water management. The health of our natural world and the activities that depend on it (like swimming and tourism) are important to water users and people in general. Often we do not return enough water to the natural world, harms other water users downstream.

Indian Urban Sanitation Policy

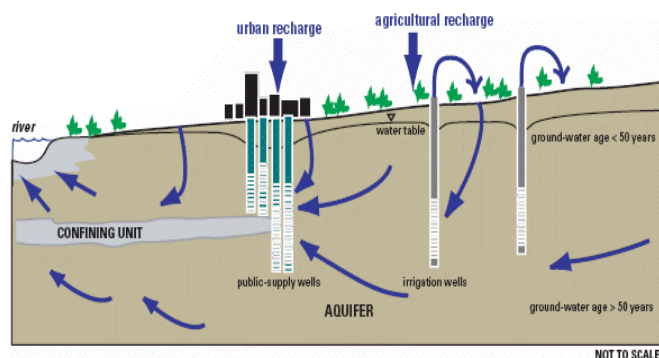
In November 2008 the government of India launched a national urban sanitation policy with the goal of creating what it calls "totally sanitized cities" that are open-defecation free, safely collect and treat all their wastewater, eliminate manual scavenging and collect and dispose solid waste safely.

As of 2010, 12 states were in the process of elaborating or had completed state sanitation strategies on the basis of the policy. 120 cities are in the process of preparing city sanitation plans. Furthermore, 436 cities rated themselves in terms of their achievements and processes concerning sanitation in an effort supported by the Ministry of Urban Development with the assistance of several donors.

At present, water requirement in the urban areas of Uttar Pradesh is 6,500 million litres a day (MLD), against which the supply is only 4,575 MLD. Besides, there are about one lakh hand pumps in the urban areas.

About 40% of the cities were in the "**red category**" (in need of immediate remedial action), more than 50% were in the "**black category**" (needing considerable improvement) and only a handful of cities were in the "**blue category**" (recovering). Not a single city was included in the "**green category**" (healthy and clean city). The rating serves as a baseline to measure improvements in the future and to prioritize actions. Water consumers today want distributing water efficiently and fairly and waste water collection and discharge quickly outside the city. They expect the treatment and distribution of their water to be efficient, safe and of high quality. The government intends to award a prize called Nirmal Shahar Puraskar to the best sanitation performers.

The technological advancements in waste water treatment using flora and fauna integrated into ecosystem in an engineered manner has stepped in firmly. This technology in the field of waste water management and its integration into the local eco systems is essential.



4. CONCLUSION

We need to strive to improve the overall productivity of water use in a sustainable way rather than seek endless sources of

new supply. It works with water users at local and community scales and seeks to protect the critical ecological services such as nutrient cycling, flood protection, aquatic habitat and waste dilution and removal that water also provides.

We must understand the burning water issues and each one must help in providing efficient and cost effective water and help in managing the wastewater management services for one and all. Recycling and re-using, using with care (with zero wastage goal) has to be on top priority, to avoid the third world war for water.

It is also essentially required to change our materialistic, destructive life- styles and work-styles for better, sufficient water on the earth for our future generations.

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